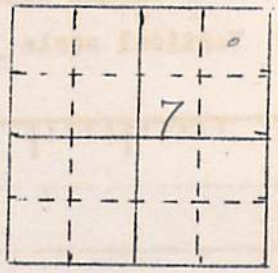
IOWA GEOLOGICAL SURVEY
In Cooperation with U. S. Geological Survey

W-1891

RECORD OF WELL



Location:

Town: Elkader (4 (N) E / S W); County Clayton

NE¼ NE¼ sec. 7 T. 93 N., R. 4 W. Read Twp.

Well name and number Clayton County Home

Owner _____ Address _____

~~Tenant~~ Mr. A.R. Dittmer, Chairman Address Strawberry Point
Clayton County Board of Supervisors

Contractor Hoeg & Ames Address Lincoln, Tama

Drillers Ed Martin and Homer Rhodes

Drilling dates August 10 - Oct 17, 1944

Well data:

Elevations: Drilling curb 1032¼ feet; Land surface 1031 feet
1020 MacAllister
1023 Harris
1031 Hale

Determined by WE+

Topographic position ridge

Total depth: Reported 783 feet; Measured _____ feet

Drilling method cable tool

Hole and casing data 35' of 10" pipe 0-35' 495' of 6" pipe 0-495' in 10" hole cemented. open hole 495-783
(Give amount, size, kind, and depth of all casing; type and position of seals and packers; cementing; how finished--perforated pipe, screen, gravel pack, open hole, etc.)
PUMP SETTING @ 305'

1031
277.8
753.2

Original depth to water 277.8 ft. ~~above~~ below curb Date Oct 17, 1944

Original elevation of water level 753.2 ft.; Source of data Whitney

Sources of water: Principal J Adam; Others _____

Production data: Date Oct 17, 1944

Static depth to water 277.8; Measuring point

Pumping level at 126 g.p.m.

Specific capacity g.p.m. per ft. drawdown; Temperature 52 °F.

Pump data: Type pump Turbine: Column. Dia. Length 285

Cylinder or bowls: Dia. Length 5; Suction pipe 20

Power Gasoline engine; Airline 380

Estimated rate of production: g.p.m. for hrs. a day

Use of water Public Drinking

WATER ANALYSES (in parts per million)

	St. Peter-Gal	Jordan		
Date sampled	Sept 13, 1944	Oct 17 1944		
Sampled by	S E Harrison	D. A. Barton		
Total solids	620	329		
Insoluble matter	8.0	0.5		
Alkalinity (Meo)	383.0	291.0		
Alkalinity (Phn)	0.0	0.0		
pH	7.0	7.4		
$Fe_2O_3+Mn_2O_3+Al_2O_3$	0.0	5.0		
Alkali as sodium	9.8	12.6		
Calcium	124.0	77.9		
Magnesium	53.9	34.9		
Iron (unfiltered)	Tr.	0.6		
Manganese	0.00	0.00		
Nitrate	69	0.18		
Fluoride	0.1	0.3		
Chloride	37.5	6.5		
Sulphate	49.0	39.5		
Bicarbonate	467.3	355.0		
Hardness (ppm)	531	338		
Hardness (gpg)	31.0	19.2		

Remarks

Laboratory data: Sample storage location

Sample range 0-780 No. spls. 138 No. dupls & cond. 138 good

Spls. prepared by Fan & Rush Washed range by

Driller's log and cond.

Insoluble residues: Prepared by Studied by Strip log

Microscopic study 0-780 strip log ✓

Gen. log ✓ Correl. by SEH Jr.

WATER LEVEL DATA

Measuring point _____

Date	Depth to water	Altitude	Remarks
Sept 13, '44	155	878	St. Peter sandstone

REMARKS

Galena - St. Peter water sample taken with bailer near the bottom & within the St. Peter. Driller reports SWL 155± about the same as the Galena water level and that 100 g.p.m. could be obtained

STATE OF IOWA
IOWA GEOLOGICAL SURVEY
GEOLOGY ANNEX
IOWA CITY

Results of Pumping Test

Clayton County Home Water Well

October 17, 1944

Name: Clayton County Home
Location: NE¼ NE¼ sec. 7, T. 93 N., R. 4 W.
Elevation of drilling curb: 1032.25 (measuring point)
Owner: Clayton County
Contractor: Hoeg and Ames
Driller: Homer Rhodes
Date started: August 10, 1944
Date finished: October 17, 1944
Depth: 783 feet, T.D.
Casing: 6" casing cemented to depth of 495' in 10" hole.
Open hole 495-783 feet.
Producing horizon: Jordan sandstone
Test pump: Turbine pump with 285' of pump column. 5 feet of bowls, 20 feet of suction pipe. Driven with 100 h.p. Buick gasoline motor on car chassis with right angle drive shaft.
Discharge pipe: 30 feet of 2½-inch fire hose.
Measuring point: Top of 6-inch casing 1.25 foot above land surface. Altitude of measuring point, 1031 feet. No measurement made with electric line nor air pressure gage.
Production: Discharge determined by filling 360 gallon galvanized tank and 550 gallon circular water tank.

IOWA GEOLOGICAL SURVEY
Iowa City, Iowa

W- 1891

Well Log Record

Owner of well Clayton Co Home County Clayton

Tenant _____ Town Elkader

Location NE - NE sec. 7, T. 93 N., R. 4 ~~W.~~ E. _____ Twp.

Curb elevation 1031 ft. Present depth _____ ft. final depth 780 ft.

Static level: (Depth to water above / below curb) _____ ft. Pumping level _____ ft. at _____ gpm.

Contractor Hoag & Ames Date drilled _____

Description*	FEET Thick	From	To	Description*	FEET Thick	From	To
Mag sh dk brn carb streaks Depaup pyr barite		33	43	Clay sh, lt grn-dk grn ls, lt gr, fn dnse gr w/ meta b 295-300		286	299½
Dub Ls lt gr-yel crse, gran red spks		43	74	M Ls, lt gr, fn m xtln at top sh, dk brn, carb		299½	305
? ls, wh, crse xtln, comp cri		74	130	same ls, bf, v. fn, dnse, met fos v. calc		305	315
Prosser cht wh ls, bn spk abdt		130	155	Ls, v. fn, dnse, lt gns gr fos met gr w. spks		315	327
ls, fn, dnse, crm v. calc some ol-gr. strks v. chty		155	205	Pec Ls crse xtln gran PO3 gr ls met gr sd		327	341
ls, lt bf-yel med-crse, comp v. calc		205	255	GW sh, lt grn qtz sd		341	350
Gray Ls, dk gns gr, v. mot, v. arg dnse v. fos tr Qtz sd much sh a p-grn-gy grn		255	267	St P.			
Blue Ls, v. fn, dns, v. fos, grn bf v. calc legs sh tr PO3 fos Qtz sd		267	274				
Oil Ls, crm-brn, fn-v. fn, v. dnse v. calc, fos red-brn sh spks PO3		274	286				

*Abbreviate descriptions; use one line for each formation.

Remarks on water zones and casings Agnew (or Herbert?)

Temperature: Air _____ °F., Water _____ °F. at _____ A.M. / P.M. _____ 19__

Record obtained from _____ Recorded by _____

9-250

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington ..... / District ..... }

GPO 6—9333

Clayton – County Home. Well Test. Oct-17-1944

D.A. Barton –

Hoover – County Engineer
McAllister – State Health Engineer
Dittmar – County Supervisor
Whitney Rhodes driller.
Whitney – Pump man

Drillers log:

Water level on St Peter at 455
Shut out all down to 495

Dirt	0-35	feet	
Rock	35-350	"	
St P.	350-455		
Shale & R.	455-475		
Rock	475-495		
"	495-675		
Joedon.	675-783	.	

10" hole drilled to 495'
6" pipe set to Bottom 495'
6" " Cemented.

305' of pump Column includes Bowles + suction pipe
5' of Bowles
20' of Suction pipe
3' of air line into water

Static water level 277' 277.8 Reckoned by Whitney
air line (3)80' in length
2

Pump Platform 15" above land surface.

9-260

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington ..... / District ..... } 2

GPO 6—9333

Clayton County Home. (#2) Oct 17-1944.

Pump:	Gasoline engine Rt angle drive - Buick engine and chassis hooked and connected to pump through transmission drive.												
	Revolutions per minute by clocking = 2600 RPM												
1144	trying to start pump by Buick engine drive.												
1250	Water arrived & rather brown & muddy.												
:51	pump stopped.												
:52													
54	Pump started.												
57	Water clear.												
1:05	Water murky												
1:12	" Clear Temperature 52°												
	Very little sand & very fine.												
1:20	water clear but carries very fine white sand.												
	Taste good.												
1:27	Water clear.												
1:34	Motor Trouble.												
1:57	Motor Started - Water not tested.												
2:05	318 gallons in 2½ min = 126 GPM Have 30' from Pump.												
2:15	Temperature 52°.												
2:16													
3:00	Filling various cisterns on property.												
3:04	Water Sample G 20 taken and water clear & some fine sand.												
3:05	500 gallons in 4:40 sec. = 107 GPM with engine trouble.												
	No air pulled during interval.												
	Every one satisfied with results. —												

2

Time	Remarks	Gallons per minute
Oct. 17, 1944		
12:49 p.m.	Trying to start pump.	
12:50	Water arrived - rather brown and muddy.	
12:51	Pump stopped.	
12:54	Pump started.	
12:57	Water clear.	
1:05	Water murky.	
1:12	Water clear. Temperature 52° Very little sand and very fine.	
1:20	Water clear but carries very fine sand. Tastes good.	
1:27	Water clear.	
1:34	Motor trouble.	
1:57	Motor started - water not riled.	
2:05	318 gal. in 2½ min. = 126 g.p.m.	
2:15	Temperature 52°	
3:00	Filling various cisterns on property.	
3:04	Water sample G-20 taken and water clear and some fine sand.	
3:05	500 gallons in 4:40 minutes = 107 g.p.m. with engine trouble.	
3:10	Pumping stopped.	

No air pulled during any part of the test.

OFFICE COPY

STATE OF IOWA
IOWA GEOLOGICAL SURVEY
GEOLOGY ANNEX
IOWA CITY

Report on the Geology and Ground-water Possibilities at Clayton County Home, Iowa

INTRODUCTION

The Clayton County Home is located approximately three miles northeast of Elkader, Iowa in the NE¼ of section 7, T. 93 N., R. 4 W., Read To nship. The Home is located about one mile north of State Highway 128 and one mile east of State highway 13.

Topographically the area is one of considerable relief. The Home is on a ridge which slopes to the north. The surface drainage is principally to the north and west into tributaries of Dry Mill Creek which itself joins Roberts Creek and the Turkey River southeast of Elkader.

GEOLOGY

The area north and east of Elkader is covered by a mantle of Kansan glacial drift which on the upland area, such as at the Clayton County Home, consists almost entirely of a thin layer of clay. The clay is usually oxidized by weathering processes to a yellow color.

Bedrock in this territory is either the basal portion of the Maquoketa formation or upper portion of the Galena formation depending upon the starting elevation and the thickness of the glacial drift. At the County Home it is anticipated that about 55 feet of the bottom of the Maquoketa formation will be present, covered by about 15 feet of Kansan drift.

Sent to: R.B. McAllister, Dept. of Health, Decorah, April 20
S.R. Ames, Lincoln, May 12
Clayton Co. Bd. of Supervisors, May 12

The Maquoketa formation in this area is made up of four members, of which only the lower two should be represented at the County Home. The uppermost of these, the Clermont member, is almost entirely a green to gray calcareous shale and about 10 feet of this should be present. Beneath this lies the Elgin member which is an argillaceous dolomite with some thin interbedded shales and should be about 45 feet thick.

The Galena formation, also of Ordovician age, lies beneath the Maquoketa formation. This formation is almost entirely a buff to tan dolomite and should be about 225 feet thick. About 100 feet below the top of this formation some cherty dolomite should be encountered which marks the top of the Prosser member of the Galena formation. This chert, in small percentages, should continue throughout the lower portion of the Galena.

The Decorah formation underlies the Galena and should be about 30 feet thick at this site. This formation consists of about 10 feet of green shale and limestone at the top, representing the Ion member, underlain by about 20 feet of limestone of the Guttenberg member.

The Platteville formation lies below the Decorah and should be about 60 feet thick. It is made up of about 15 feet of shale and limestone at the top, representing the Spechts Ferry member, followed by about 25 feet of limestone, 15 feet of dolomite and 5 feet of green shale in descending order. These last three lithologic units represent the McGregor, Pecatonica and Glenwood members of the Platteville formation.

The St. Peter formation underlies the Platteville formation and should be about 55 feet thick. It is composed of a clean, white, medium-grained sandstone.

The Prairie du Chien formation lies beneath the St. Peter sandstone and should be about 255 feet thick. This formation consists of three members which, in descending order, are the Willow River, the Root Valley (New Richmond), and the Oneota. The Willow River is made up of about 55 feet of sandy dolomite; the Root Valley (New Richmond) consists of about 45 feet of sandstone and sandy dolomite; and the Oneota is composed of about 155 feet or slightly more of dolomite, cherty in part. The chert in the Oneota should begin about 30 feet below the top of this member and continue in depth for about 85 feet.

The Jordan sandstone, of Cambrian age, lies beneath the Prairie du Chien formation and should be about 90 feet thick at this location. The upper 20 to 25 feet are sandstone with some dolomite and the lower portion almost entirely a clean, white sandstone resembling the St. Peter in many respects.

The Jordan is underlain by the dolomitic siltstone of the Lodi formation and the dolomites of the St. Lawrence formation.

A summary of these formations, with thicknesses and brief description, is given in a table at the end of this report.

GROUND WATER POSSIBILITIES

The first source of appreciable amounts of ground water to be encountered in drilling at the Clayton County Home will be the Galena formation. Some water should be found in porous zones and cracks and crevices in the dolomite of this formation. Little is known as to the amount available, its head or quality, but in all probability the supply will not be sufficient for the needs of the County Home.

The St. Peter sandstone furnishes water to a number of farm and small town wells in this territory. In a properly constructed well to this formation more than 100 gallons a minute should be available. Temperature of this water should be about 52 degrees Fahrenheit throughout the year. The static water level should be quite low, probably about 350 feet below land surface. This water should be of good quality, similar to the analysis of water from the Garnavillo city well which is given at the end of this report.

Some water should be found in the dolomites and sandstones of the Prairie du Chien formation, and quite abundant supplies are known to be available from the underlying Jordan sandstone. Water from the Jordan should have a temperature of about 55 or 56 degrees Fahrenheit and the water level in a well to this horizon should stand about 275 feet below land surface. The quality of water from the Jordan should be similar to that obtained at Elkader, an analysis of which is given at the end of this report.

PRESENT WATER SUPPLY

No information is available in the files of the Iowa Geological Survey as to the present water supply at the Clayton County Home. Likewise no information is available as to the consumption of water at the Home or as to possible reasons why additional development of water supply would be necessary.

RECOMMENDATIONS FOR FUTURE DEVELOPMENT

In the event that a new well is to be drilled for the Clayton County Home, it is suggested that it be constructed to develop water from the St. Peter sandstone or from the deeper Jordan sandstone.

The St. Peter sandstone should furnish enough water for the needs of the Home and it would require a well about 450 feet deep to develop this horizon properly. Casing would be required through the surficial deposits and the Maquoketa shales, or to a depth of about 75 feet. Normally the shales of the Decorah and Platteville formations in this region do not cave and hence would not have to be cased.

The disadvantage to developing a well in the St. Peter sandstone would be the low water level which would increase pumping costs and the possible, although perhaps not likely, contamination of this source through the numerous farm and private wells drilled to this aquifer in that area.

A well to the Jordan sandstone would have to be about 775 feet deep and would therefore be more costly, but would have the advantages of a higher water level and probably greater capacity. In addition, a well drilled to the Jordan could be constructed so as to shut off all water above and including the St. Peter sandstone if contamination seemed likely.

In the event that a new well is drilled it will be appreciated if the Board of Supervisors will instruct the driller to save samples of formations penetrated, such samples to be taken at each 5-foot interval of drilling or at a change of formation if less than 5 feet. The Iowa Geological Survey will be glad to furnish containers for these samples and log books.

by: K. E. Anderson
April 19, 1944

APPENDIX

Forecast of Geologic Formations

for a well to be drilled at the Clayton County Home

(All depths are based on a starting elevation of 1020 feet) 1031

Formation	Thickness		Depth	
Pleistocene system				
Kansan stage (yellow clay)	15±	30	0 to 15± feet	30'
Ordovician system				
Maquoketa formation				
Clermont member (calcareous shale)	10±		15± to 25	
Elgin member (argillaceous dolomite)	45	8	25 to 70	38
Galena formation (dolomite; cherty Prosser member from 170-295 feet)	225	217	70 to 295	255
Decorah formation				
Ion member (shale and limestone)	10		295 to 305	
Guttenberg member (limestone)	20		305 to 325	
Platteville formation				
Spechts Ferry member (shale and limestone)	15		325 to 340	
McGregor member (limestone)	25		340 to 365	
Pecatonica member (dolomite)	15		365 to 380	
Glenwood member (green shale)	5		380 to 385	348
St. Peter formation (sandstone)	55	112	385 to 440	460
shale (5)				
Prairie du Chien formation		190		
Willow River member (sandy dolomite)	55		440 to 495	
Root Valley member (dolomite sandstone)	45		495 to 540	
Oneota member (dolomite; cherty from about 570-655 feet)	155		540 to 695	650
Cambrian system				
Jordan formation (sandstone, dolomitic near the top)	90		695 to 785	

Mineral Analyses of Ground Water

(all figures in parts per million except as noted)

Name of Well	Garnavillo City Well	Elkader City Well
Source of water	St. Peter sandstone	Jordan sandstone
Total solids	478.	349.
Insoluble matter	17.4	17.4
pH	7.1	7.3
Alkalinity (MeO)	290.	270.
Alkalinity (Phn)	0.0	0.0
$Fe_2O_3 + Al_2O_3 + Mn_2O_3$	1.6	1.6
Sodium	16.1	11.5
Calcium	80.0	69.1
Magnesium	35.1	32.4
Iron	0.0	0.3
Manganese	0.0	0.0
Nitrate	0.28	0.00
Fluoride	0.0	0.0
Chloride	38.0	4.0
Sulphate	30.9	61.0
Bicarbonate	354.0	329.5
Calculated hardness (as ppm $CaCO_3$)	344.	306.
Calculated hardness (as grains per gallon $CaCO_3$)	20.2	17.9